UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

July 18, 2019

Mr. Daniel G. Stoddard
Senior Vice President
and Chief Nuclear Officer
Virginia Electric and Power Company,
Innsbrook Technical Center,5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2 – DESIGN BASIS ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT 05000338/2019010 AND 05000339/2019010

Dear Mr. Stoddard:

On June 7, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your North Anna Power Station, Units 1 and 2 and discussed the results of this inspection with Larry Lane, Site Vice President, and other members of your staff. On July 18, 2019, a re-exit meeting was conducted, and the results were discussed with Jim Jenkins, Director of Safety and Licensing at North Anna, and other members of the licensee staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance or severity of the violations documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC Resident Inspector at North Anna.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

James B. Baptist, Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos.: 05000338 and 05000339
License Nos.: NPF-4 and NPF-7

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV

SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2 – DESIGN BASIS ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT 05000338/2019010 AND 05000339/2019010

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OFFICE	DRS	DRS	DRS	DRS	DRS
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DATE	7/17/2019	7/17/2019	7/18/2019	7/17/2019	7/18/2019

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000338 and 05000339
License Numbers:	NPF-4 and NPF-7
Report Numbers:	05000338/2019010 and 05000339/2019010
Enterprise Identifier:	I-2019-010-0024
Licensee:	Virginia Electric and Power Company (VEPCO)
Facility:	North Anna Power Station, Units 1 and 2
Location:	Mineral, Virginia 23117
Inspection Dates:	May 13, 2019 to June 07, 2019
Inspectors:	B. Collins, Reactor Inspector T. Fanelli, Senior Reactor Inspector M. Greenleaf, Reactor Inspector T. Su, Reactor Inspector
Approved By:	James B. Baptist, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a design basis assurance inspection (teams) inspection at North Anna Power Station, Units 1 and 2 in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

Failure to Qualify Containment Components for Initial Acidic Chemical Environment			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000338,05000339/2019010-01 Open/Closed	None (NPP)	71111.21N
The inspectors identified a Green finding and associated Non-cited Violation (NCV) of 10 CFR 50.49(e)(3) when the licensee failed to qualify all 10 CFR 50.49 electrical equipment for the most severe chemical effects expected in containment.			

Failure to Verify the Adequacy of Design for Aging and Accident Profile Testing			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000338,05000339/2019010-02 Open/Closed	None (NPP)	71111.21N
The inspectors identified three examples of a Green finding and associated Non-cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III when the licensee failed to verify compliance with environmental qualification (EQ) requirements in accordance with design control manual NDCM-3.3 Rev. 11, "Design Verification."			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000338,05000339/2019010-03	Potential 50.9 Violation for Incomplete Information Submittal	71111.21N	Open

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.21N - Design Bases Assurance Inspection (Programs)

The inspectors evaluated the environmental qualification program implementation through the sampling of the following components: (IP Section 02.01)

Primary Containment (Inside Containment) (6 Samples)

(1) Victoreen Radiation Monitoring System
(2) Gamma-Metrics Neutron Flux Monitors
(3) Boston Insulated Wire (BIW) - Cable - Cross Linked Polyethylene (XLPE) / Neoprene Jacket
(4) Pressurizer Vent Line Solenoid Operated Valve 2-RC-SOV-202A1 (Target Rock)
(5) Connectron Terminal Block NSS3
(6) PORV Limit Switch 1-RC-PCV-1455C (ZS-PCV-1455C-A1) (NAMCO)

(Outside Containment) (2 Samples)

(1) Motor Operated Valve (MOV) Pump Suction from Containment Sump 2SI-MOV--FC-2860A&B (Limitorque)
(2) Validyne Engineering Corporation, Multiplexer, Cables, Connectors, Inadequate Core Cooling System

INSPECTION RESULTS

Failure to Qualify Containment Components for Initial Acidic Chemical Environment			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000338,05000339/2019010-01 Open/Closed	None (NPP)	71111.21N
The inspectors identified a Green finding and associated Non-cited Violation (NCV) of 10 CFR 50.49(e)(3) when the licensee failed to qualify all 10 CFR 50.49 electrical equipment for the most severe chemical effects expected in containment.			
Description: During design basis accidents in which equipment important to safety must perform their safety function, the quench spray (QS) system actuates to reduce pressure and			

temperature in containment. The QS system is designed to take water from an internal weir inside the refueling water storage tank (RWST) and pump it to spray rings inside containment. The sprayed water reduces the temperature and pressure associated with the design basis accident. The sprayed water from the QS system also provides a certain amount of "iodine scrubbing" to the containment atmosphere in which postulated radioactive iodine would be captured by the water as it fell, entrapping it in solution. To accomplish this, the water is buffered with sodium hydroxide (NaOH) to a basic pH (pH > 7.0).

The design of the QS system includes a 5-minute time delay for sodium hydroxide injection into the RWST. By licensee calculations and UFSAR Section 6.2.3.1.1, the initial spray pH in containment prior to the mixing of sodium hydroxide in the spray could be as low as 4.7. The licensee's environmental zone description describes the chemical spray as 8.6-10.6 pH from 0-4 hours then 7-8.6 from 4 hours to termination of sprays.

The result of this discrepancy is that the licensee has never qualified any equipment inside containment for this initial chemical spray condition in which only diluted boric acid is being sprayed into containment. The initial period of spray could be significant because, even though the duration of exposure to the acidic conditions would be relatively short, the equipment in containment would absorb (be wetted) and potentially retain the acidic solution throughout the accident.

An inspection sample, BIW 300 V instrument cable, was reviewed by the inspectors to determine if any chemical incompatibility existed between the materials of construction and the diluted boric acid. Using various chemical compatibility tables, the inspectors determined that the neoprene jacket could be adversely affected by the effects of the boric acid spray.

Corrective Actions: The licensee gathered additional information from other nuclear utilities and was able to conclude that the various components in containment were functional. The licensee entered this issue into their corrective action program and plans to perform the required analysis or testing to demonstrate that all equipment that must conform to 10 CFR 50.49 is qualified for the licensee's containment spray conditions.

Corrective Action References: CR 1123701

Performance Assessment:

Performance Deficiency: The licensee's failure to qualify equipment inside containment subject to 10 CFR 50.49 to the most extreme chemical environment was a performance deficiency. Specifically, Division of Operating Reactors (DOR) Guidelines Sections 4.1.4 and 4.2.4, NUREG-0588 Section 1.3, and Institute of Electrical and Electronics Engineers (IEEE) Std. 323-1974 Section 6.3.6 state that the equipment to be qualified should be demonstrated to be qualified (by test) for the most severe caustic environment it is expected to see given the most limiting single failure.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone. Specifically, the failure to qualify 10 CFR 50.49 equipment in containment for the most severe chemical composition of containment spray fails to ensure the reliability and capability of those components to perform their safety function when called upon during a design basis accident.

Significance: The inspectors assessed the significance of the finding using IMC 609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power."

Cross-Cutting Aspect: Not Present Performance. No cross cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: 10 CFR 50.49(e)(3) requires, in part, that qualification of electrical equipment important to safety be based on the composition of chemicals at least as severe as that resulting from the most limiting mode of plant operation.

Contrary to this, since February 2, 1983, the licensee failed to base qualification on the composition of chemicals at least as severe as that resulting from the most limiting mode of plant operation when they failed base qualification of electrical equipment important to safety inside containment on the composition of chemicals at least as severe as that resulting from the most limiting mode of plant operation.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.

Failure to Verify the Adequacy of Design for Aging and Accident Profile Testing			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000338,05000339/2019010-02 Open/Closed	None (NPP)	71111.21N

The inspectors identified three examples of a Green finding and associated Non-cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III when the licensee failed to verify compliance with environmental qualification (EQ) requirements in accordance with design control manual NDCM-3.3 Rev. 11, "Design Verification."

Description:

Example 1:

For Units 1 and 2, the licensee failed to verify that post-accident Arrhenius calculations demonstrated the required post-accident-operating-time (PAOT) of 120 days for 300V Boston Insulated Wire (BIW) instrument cables.

Specifically, the licensee's Plant Qualification Evaluation (PQE) NA-EQUAL-000-PQE-06.02-P01, "Boston Insulated Wire & Cable Co. XLPE/NEO 300 V Instrument Cable." Rev. 1, verified that the site EQ requirements were met by the qualification testing documented in BIW qualification report 8714. The BIW report specified that unaged cable samples were subjected to loss-of-coolant-accident (LOCA) simulations, including PAOT, for approximately 34 hours. The PQE evaluation of the BIW cable testing, however, incorrectly based qualification on a test duration that lasted more than 400 days. When inspectors informed the licensee of this error, the licensee re-ran their PAOT calculation and determined that the cables could not meet their PAOT mission time.

Example 2:

For Units 1 and 2, BIW 300 V instrument cables were identified as deficient in aging for qualified life in NRC safety evaluation reports (SERs) in 1983. The licensee claimed a qualified life of 40 years, which was not supported by the cable qualification documentation. The qualification test used unaged cable for the LOCA testing even though the cable was identified as being vulnerable to the deleterious effects of thermal aging. In response to the SERs, the licensee devised a surveillance and maintenance schedule to monitor cables and replace them as needed. Sometime after the NRC concern was closed, the licensee determined that surveillance was not practical and decided to determine a qualified life.

Since the cables were not aged prior to testing to establish a qualified life, the licensee used the vendor-supplied thermal regression line to determine a qualified life in excess of 73 years. Fundamentally, a regression line, alone, is insufficient to determine a qualified life because it does not account for a design basis accident at the end of life plus a PAOT of 120 days. These cables must perform their safety functions at the end of a lifetime of radiation aging, thermal aging, and other aging effects during and following design basis accidents for a minimum of 120 days. The license failed to verify that their calculational methods met their design control requirements.

Example 3:

Initially, the licensee utilized information from Conax testing (aging time, aging temperature) and a science paper published in the Society of Polymer Engineers (SPE) Journal in March 1968 (activation energy) to establish a 15.92-year qualified life (22.26 years when accurate numbers are used). Subsequently, the licensee made use of information in a Curtiss Wright System 1000 database entry (slope, intercept), which came from the same 1968 science paper, and determined that the lifetime of polysulfone was 4,103 years. As such, the licensee concluded that polysulfone is not susceptible to thermal aging. The 1968 science paper stated that "…downward extrapolation by 20C or 30C can be done with confidence and enable one to estimate useful life at end-use operating temperatures." The licensee failed to apply these limitations when they determined that polysulfone was not susceptible to thermal aging, indefinitely. In this manner, the licensee failed to meet the requirements of NDCM 3.3 Section 6.2.7, "Design Reviews."

Because the determination that the polysulfone terminal blocks are not susceptible to thermal aging was inappropriate, the established qualified life of these components was 15.92 years (22.26 years), and because the licensee failed to realize this until it was identified by the inspectors, the components which were currently installed in the plant - which have been installed since initial operation of Unit 2 (August 1980) – are beyond their established qualified life.

Corrective Actions: The licensee entered these three issues into their corrective action program and determined that the components were functional but non-conforming.

Corrective Action References: CR 1123419, CR 1124362, CR 1124174, and CR 1124632

Performance Assessment:

Performance Deficiency: The licensee failed to verify that design inputs were selected correctly and that design inputs were correctly used in accordance with Design Control Manual NDCM 3.3 Section 6.2.7, “Design Reviews.”

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone objective and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of the RCS. Specifically, the licensee failed to establish a qualified life and replace components (instrument cables; terminal blocks) on that interval. Keeping a component in service that has exceeded its qualified life reduces the reliability of that device to perform its safety function when called upon in a design basis accident.

Significance: The inspectors assessed the significance of the finding using IMC 609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.”

Cross-Cutting Aspect: Not Present Performance. No cross cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: 10 CFR 50 Appendix B Criterion III requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to the above, since July 7, 1986, the licensee failed to provide design control measures for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program for their 300 V instrument cables and Connectron terminal blocks.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.

Unresolved Item (Open)	Potential 50.9 Violation for Incomplete Information Submittal 05000338,05000339/2019010-03	71111.21 N

Description: An unresolved item (URI) was identified regarding a potential 10 CFR 50.9 violation for the licensee’s submittal of incomplete information. Specifically, on June 22, 2000, the licensee submitted a proposed technical specification change (“Virginia Electric and Power Company North Anna Power Station Units 1 and 2 Proposed Technical Specification Changes Increased Boron Concentration,” ADAMS ML003728735) intended to allow increasing boron concentration in the RWST, casing cooling tank, safety injection accumulators, and the spent fuel pool. Section 3.3.3 of the submittal was titled “Post-LOCA Containment Sump and QS pH Analysis,” and stated, in part: “After consideration of the proposed revised boron concentrations in the RWST, CCT, and SIAs, the QS and post-LOCA sump pH analysis limits continue to be met. Specifically, the post-LOCA containment sump pH is calculated to be between 7.0 and 9.5, and the QS pH is calculated to be between 8.5

and 10.5 with at least 95% probability and confidence." Additionally, Section 3.4.2 of the submittal was titled "Equipment Qualification," and stated, in part: "Increasing the boron concentration to 2600 to 2800 ppm in the RWST and CCT and to 2500 to 2800 ppm in the SIAs will not adversely affect the environmental qualification of equipment in the Equipment Qualification Master List (EQML). The corrosive agent in chemical spray is primarily NaOH. Increasing the boron concentration lowers the solution pH making it less corrosive (more neutral). Therefore, higher boron concentration limits are acceptable, even for those components qualified at a lower boron concentration." The team identified that the QS system operates in a manner which results in RWST water, with a pH as low as 4.7, spraying down containment for at least the first five minutes of a LOCA. The submittal did not include this information and was therefore incomplete. The team also identified that the licensee had not evaluated the equipment qualification for this low pH condition for components in containment

Planned Closure Actions: This is an unresolved item pending NRC determination of whether the issue was material in accordance with the NRC Enforcement Policy (ADAMS ML19123A129), Section 2.3.11, "Inaccurate and Incomplete Information," and the NRC Enforcement Manual (ADAMS ML 18018B134), Part II, Section 1.5, "Material False Statements and Completeness and Accuracy of Information."

Licensee Actions: The 50.9 aspect of this issue is an administrative issue and poses no immediate safety or security concerns. The licensee has entered the associated NCV issue into their Corrective Action Program as CR1123701 and has stated that they will address the potential 50.9 violation if the NRC determines one exists.

Corrective Action References: CR1123701

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On June 7, 2019, the inspectors presented the design basis assurance inspection (teams) inspection results to Larry Lane, Site Vice President, and other members of the licensee staff.
- On July 18, 2019, the inspectors presented the Re-Exit to Jim Jenkins, Director of Safety and Licensing at North Anna, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21N	Calculations	11715-ES-188-1	Equipment Temperature Transient for Polysulfone Terminal Blocks	06/24/1983
		CT-REPORT-000-EE-0024	Generic Performance Requirement Assessment for Cable, Terminal Block, Splice and Circuitry Performance at North Anna and Surry Power Stations	Rev. 1
		CT-REPORT-000-EQ-0024	Resolution of IEIN 82-03 Environmental Testing of Electrical Terminal Blocks for Surry and North Anna Power Stations	Rev. 0
		CT-REPORT-000-EQ-0030	Usage of Electrical Terminal Blocks in Nuclear Power Stations for Surry and North Anna Power Stations	Rev. 0
		CT-REPORT-000-EQ-0079	Electrical Equipment Environmental Qualification Design Basis for North Anna and Surry Power Stations	Rev. 0
		ETC-NA2004-1	Thermal Aging Analysis of Boston Insulated Wire and Cable Co. Instrument Cable	Rev. 1
		ETE-NA-2017-0014	Arrhenius Basis for Target Rock SOV Equivalent Temperature	Rev. 0
		NA-CALC-NFL-SM-0415	North Anna Quench Spray and Post-LOCA Sump pH Calculations (Revised Safety Analysis Limits (SALs) for RWST and CAT	Rev. 2
		NA-CALC-NFL-SM-0415	North Anna Quench Spray and Post-LOCA Sump pH Calculations (Revised Safety Analysis Limits (SALs) for RWST and CAT)	Rev. 2
		NA-CALC-NFL-SM-0415 (ADD-002-00D) - GSI 191 pH	North Anna Quench Spray and Post-LOCA Sump pH Calculations (Revised Safety Analysis Limits (SALs) for RWST and CAT)	Rev. 2
		NA-EQUAL-000-59-EZD	Environmental Zone Descriptions	Rev. 27
		NA-REPORT-000-EQ-0049	Temperature Monitoring Data	Rev. 1
		NE-118	Temperature Response of Environmentally Qualified Equipment Due to the North Anna Power Station MSLB Profile in Containment	Rev. 0
		SDBD-NAPS-EI	System Design Basis Document for Electrical	Rev. 15

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Instrumentation and Computer Systems – North Anna Power Station	
		SM-1516	North Anna MSLB Containment Response with GOTHIC	Rev. 0
		System 1000 Revision 17.0.d TTR Report	Time-Temperature Regression Calculation: Polysulfone Tensile Impact Strength	05/19/2019
	Corrective Action Documents Resulting from Inspection	1123369	Target Rock Qualification Editorial Discrepancy	05/15/2019
		1123419	2019 NRC EQ DBAI - Inaccurate BIW Cable Post-Accident Operating Time	05/15/2019
		1123437	2019 NRC EQ DBAI – Connectron Terminal Block Discrepancies in EQ File	05/15/2019
		1123503	2019 NRC EQ DBAI – Validyne Multiplexer Heat Rise	05/16/2019
		1123701	2019 NRC EQ DBAI – Acidic Spray Evaluation in EQ Program	05/21/2019
		1123788	2019 NRC EQ DBAI - Additional Qualification References for NAMCO Limit Switches	05/22/2019
		1124174	2019 NRC EQ DBAI - BIW 300V Instrumentation Cable Qualification Issues	Rev. 0
		1124362	2019 NRC EQ DBAI - CM-AA-EQ-10 Discrepancy for Regression Analysis	06/06/2019
		1124495	2019 NRC EQ DBAI – Validyne Qualified Parts File Discrepancy	06/05/2019
		1124531	2019 NRC EQ DBAI - Cable Vault Environmental Zone Inaccuracy	06/05/2019
		1124534	2019 NRC EQ DBAI – Target Rock SOV Heat Rise Justification Discrepancy	06/05/2019
		1124537	2019 NRC EQ DBAI – Terminal Block Discrepancies in LR-1011/LR-2011	06/05/2019
		1124632	2019 NRC EQ DBAI – Issues of Concern: Connectron Terminal Blocks	06/06/2019
		1124643	2019 NRC EQ DBAI – Information provided in Amendments related to Raising RWST Boron Concentration	06/06/2019
		1124647	2019 NRC EQ DBAI – Terminal Blocks Installed Inside Containment Discrepancy	06/06/2019

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		1124648	UFSAR Ch. 3 for MSLB analysis	06/06/2019
	Drawings	11715-FE-7EE SH-001	Multiplexer Panels Sh. 7 Technical Support Center Wiring Diagram, North Anna Power Station - Unit 1	Rev. 12
		12050-ECI-110DA	Pressurizer Spray Safety and Relief Tank Piping North Anna Power Station - Unit 2	Rev. 6
		13075-FE-7EC	One Line Diagram Technical Support Center Multiplexer System SH. 1 North Anna Power Station Unit 1	Rev. 5
		79AB-008-2	Solenoid Operated Globe Valve High Temp., High Press. Energize to Open 1"	
	Engineering Changes	NA-17-00158	Pressurizer Head Vent Equivalent Solenoid Valves/ NAPS/ Unit 2	Rev. 1
	Engineering Evaluations	CT-EQUAL-000-GQE-34.04-G01	Test Report for Nuclear Environmental Qualification of Patel 1/2 Inch Electrical Connector	Rev. 0
		CT-EQUAL-000-GQE-34.04-P01	Test Report for Nuclear Environmental Qualification of Patel 1/2 Inch Electrical Connector	Rev. 0
		EQ-0049	Evaluation of Temperature Monitoring Data from North Anna Power Station	Rev. 1
		EQ-0050	Evaluation of Target Rock Report TERI 018 for the Replacement Terminal Block Insulating Material	Rev. 1
		ET-CEP-02-0015	Justification and Implementation Plan for the Use of MOV Long Life Grade 1 Grease North Anna and Surry Power Stations Units 1&2	Rev. 2
		ETE-NA-2014-0001	Evaluation of LED Replacements for Incandescent Indicator Lights	Rev. 1
		ETE-NA-2016-0065	Review of EQ Documentation and Procedures for EGS P-I Thread Sealant for EGS Quick Disconnect Connectors	Rev. 1
		ETE-NA-2018-0018	Acceptability of NSS3 EQ Terminal Blocks for NUREG-0588	Rev. 0
		NA-ENGT-000-CEP 99-0042	Equipment Qualification Considerations due to Increased Boron Concentrations	Rev. 0
		NA-EQAL-000-PQE-17.01-P01	Plant Qualification Evaluation: Connectron NSS3 Terminal Block	Rev. 2
	Miscellaneous	45050-1	Wyle Test Report for Victoreen Two High-Range Containment Area Radiation Monitoring Systems	Dated June 12, 1981

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		58666	Wyle Laboratories Nuclear Environmental Qualification of Module Case and Electric and Electronic Components of the P.C. Boards and Plug-In Modules of the Remote Multiplexer Units, Model Nos. MC170AD-Q2 and MC370AD-Q2 for Validyne Engineering Corporation	12/16/1981
		9834	Validyne Qualification Specification for Remote Multiplexer Units and Associated Signal Conditioner Modules	Rev. 13
		CM-AA_EQ-10	Fleet EQ Program Description	Rev. 3
		CO-NRC-000-00-305	Letter from David A. Christian to U.S. Nuclear Regulatory Commission, Virginia Electric and Power Company North Anna Power Station Units 1 and 2 Proposed Technical Specification Changes Increased Boron Concentration	06/22/2000
		CO-NRC-000-00-556	Letter from Leslie N. Hartz to U.S. Nuclear Regulatory Commission, Virginia Electric and Power Company North Anna Power Station Units 1 and 2 Proposed Technical Specification Changes Increased Boron Concentration Request for Additional Information	11/15/2000
		CT-EQUAL-000-CT-EQUAL-000-GQE-06.16-G02	Generic Qualification Evaluation, Validyne Engineering Corporation, Multiplexer, Cables, Connectors, Models MC170AD-Q2 and MC370AD-Q2	Rev. 0
		CT-EQUAL-000-CT-EQUAL-000-PQE-06.16-P02	Plant Qualification Evaluation, Validyne Engineering Corporation, Multiplexer, Cables, Connectors	Rev. 1
		CT-EQUAL-000-PQE-35.04-P02	Target Rock Solenoid Valve 79AB-008BB-1	Rev. 2
		CT-SPEC-000-NUC-0001	Specification for Electrical and Fiber Optic cable North Anna and Surry Power Stations Units 1 and 2	Rev. 7
		EGS-TR-913601-01	Nuclear Environmental Qualification Report of EGS 3/4 Inch Quick Disconnect Electrical Connector	Rev. B
		EGS-TR-913602-01	Nuclear Environmental Qualification Report of EGS 1 ½ Inch Quick Disconnect Electrical Connector	Rev. B
		EQTR 3996A	Qualification Test Report for the Environmental Qualification of the Target Rock Corporation Solenoid Operated Globe Valves in Accordance with Standard Case IV Conditions	01/19/1984

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			(Modified)	
		ET-CEP-05-0022	Review of EQ Accident Profiles in Support of GSSI-191 Sump Strainers	Rev. 0
		ET-CEP-06-0016	Review of EQ Accident Profiles in Support of GSI-191 Sump Strainers	Rev. 0
		ET-NAF-06-0083	NAPS MSLB/LOCA GOTHIC Analysis Data for EQ Pressure and Temperature Limits	Rev. 0
		IPS-107	Conax Test Procedure and Report on Electrical Terminations Subjected to Design Basis Accident Environment	10/5/1973
		IPS-325	Conax Design Qualification Material Test Report for Materials Used in Conax Nuclear Products for Service in Nuclear Power Generating Stations	Rev. E
		NA-EQUAL-000-59-EZD	North Anna Environmental Zone Description Units 1 & 2	Rev. 27
		NA-EQUAL-000-PQE-06.02-P01	XLPE/NEO 300 V Instrument Cable	Rev. 1
		NA-SPEC-000-NAS-0128	Specification for 300 V Instrument Cable for North Anna Power Station 1975 Extension North Anna Power Station	Rev. 5
		PEI-TR-880701-04	EGS Test Report for Nuclear Qualification of Patel/EGS ½ connector	Rev. A
		QDR-N-6.1	Boston Insulated Wire & Cable Co. XLPE/NEO	Rev. 5
		QTR 157	Generic Qualification of EA180 Series Limit Switches with Receptacle and connector/Cable Assemblies	Rev. 2
		QTR 500	Qualification of NAMCO EC290-Series Receptacle Assemblies and Connector/Cable Assemblies for Use in Nuclear Power Plants in Compliance with IEEE Standards	Rev. 0
		QTR 510	Qualification of NAMCO EA180-Series Limit Switches with EC290-Series Receptacle and Connector/Cable Assemblies for Use in Nuclear Power Plants in Compliance with IEEE Standards	Rev. 0
		QTR 82-002	Nuclear Environmental Qualification of the Remote Multiplexer Unit Models MC170AD-Q2 and MC370AE-Q2 and Associated PC Boards and Plug-In Modules	Rev. B
		Safety Evaluation	Safety Evaluation for Environmental Qualification of Safety-	03/24/1983

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		Report	Related Electrical Equipment	
		SPE Journal Vol. 24 (p.52 – 55)	Testing for Thermal Endurance: A Case History Based on Polysulfone Thermoplastic, T. Bugel	March 1968
		TR-4501	Hot Flow Continuous Energization Solenoid Valve Test Model 1032110-4	09/11/1986
		WCAP-8687, Supp. 2-H10A	Equipment Qualification Test report Target Rock Isolation Solenoid Valve (One Inch) (Environmental and Seismic Testing)	Rev. 2
	Procedures	0-ECM-0202-01	Installation and Removal of EGS Bayonet Connectors	Rev. 20
		0-ECM-0206-01	Installation of Lugs	Rev. 13
		0-ECM-2002-01	Trouble-Shooting and Repair of Namco Limit Switches	Rev. 16
		0-ECM-2104-01	Trouble-Shooting and Repair of Target Rock Solenoid-Operated Valves	Rev. 17
		0-EPM-1503-01	Inspection of Limitorque Motor-Operated Valves	Rev. 18
		2-PT-210-12	Valve Inservice Inspection (RCS Gaseous Vent System)	Rev. 14
		CM-AA-DDC-201	Design Changes	Rev. 22
		CM-NA-EQ-100	Environmental Qualification Program Implementation	Rev. 6
		CM-NA-EQ-100	Environmental Qualification Program Implementation	Rev. 6
		CO-EQUAL-000-91-EQPM	Equipment Qualification Procurement Manual	Rev. 43
		CO-PROGRAM-000-CM-AA-EQ-10	Fleet EQ Program Description	Rev. 3
		DNES-AA-MOV-1001	Motor-Operated Valve Diagnostic Test Preparation and Evaluation	Rev. 3
		NA-EQUAL-000-59-EQMM	Equipment Qualification Maintenance Manual	Rev. 52
		NA-GARDNA-000-CM-AA-EQ-1000	EQ Walkdowns	Rev. 4
		NA-PROCNA-ADM-CM-NA-EQ-100	Environmental Qualification Program Implementation	Rev. 6
		NA-PROCNA-	North Anna Breaching Environmental Zones	Rev. 0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		ADM-CM-NA-EQ-101		
		PDBD-NAPS	Plant Design Basis Document for North Anna Power Station	Rev. 6
	Self-Assessments	PIR1076739	NAPS SPS EQ Program Self-Assessment 2017	2017